

A REVIEW OF TWO NEARCTIC SHORE-FLY SPECIES IN THE GENUS  
*PSILOPA* FALLÉN THAT WERE INCLUDED IN THE GENUS  
*CRESSONOMYIA* ARNAUD (DIPTERA: EPHYDRIDAE)

WAYNE N. MATHIS AND TADEUSZ ZATWARNICKI

(WNM) Department of Systematic Biology, MRC 169, P.O. BOX 37012, Smithsonian Institution, Washington, DC 20013-7012, U.S.A. (e-mail: mathis.wayne@nmnh.si.edu); (TZ) Museum and Institute of Zoology, Polish Academy of Sciences, ul. Wilcza 64, 00-679 Warsaw, Poland, and Department of Biosystematics, University of Opole, ul. Oleska 22, 45-052 Opole, Poland (e-mail: zatwar@uni.opole.pl)

---

*Abstract.*—*Psilopa aeneonigra* Loew, a shore fly that was described in *Psilopa* but was for many years placed in the genus *Cressonomyia* Arnaud, is returned to *Psilopa*. A second species, *P. loewi* n. sp. (New Jersey, Ocean: Tuckerton (10 km N; 39°41.3'N, 74°21.6'W), that had been misidentified as *P. aeneonigra* is also recognized and described. The descriptions of these two species include the first illustrations of structures of the male terminalia.

*Key Words:* Diptera, Ephydriidae, Nearctic, shore flies, *Cressonomyia*, *Psilopa*

---

Hermann Loew (1878) described *Psilopa aeneonigra* from specimens that a Russian diplomat and early promoter of American dipterology, Baron C. R. Osten Sacken, had acquired from Texas (see Osten Sacken 1903 and Smith 1978 for an appreciation and short biography of Osten Sacken). The specimens were subsequently sent to Germany where Loew resided, and after Loew's study and description of the new species, the syntypic series was eventually deposited in the Museum of Comparative Zoology, Harvard University. Loew's species, which is now known to be more widespread, and a new species that was misidentified as *P. aeneonigra* are the subjects of this paper. As appropriate, these species are either redescribed or described, including the first illustrations of structures of the male terminalia.

*Psilopa aeneonigra* remained in its original nomenclatural combination for nearly a century until Wirth (1965) transferred the

species to the genus *Cressonomyia* Arnaud. The transfer was presumably made because of the slightly darkened base of the wing. Apparently, the darkened base of the wing is a homoplasious condition, as a more extensively darkened base (extending onto the base of the remigium) is a synapomorphy that establishes the sister-group relationship between *Cressonomyia* and *Peltopsilopa* Cresson (Mathis and Zatwarnicki 2004).

This paper is a further result of a recent revision of *Cressonomyia* (Mathis and Zatwarnicki 2004). While studying specimens of *Cressonomyia* we discovered that *P. aeneonigra* is not a congener, and, moreover, that there is a second species that is similar, closely related, and apparently undescribed. These discoveries occurred while studying structures of the male terminalia, which prompted us to re-examine external characters as well. For example, the color of the halter is dark brown to black in *Cressonomyia* (a synapomorphy that further es-

establishes the monophyly of *Cressonomyia* and *Peltopsiloa*), whereas in these two species the knob is white to yellowish white, which is the plesiomorphic state.

Another available name, *Psilopa fulvipennis* Hine (1904), has also been considered in our treatment of these species. Hine's species was described from specimens collected in Louisiana, a locality well within the known distribution of *P. aeneonigra*. In 1942, Cresson suggested that these two species are synonyms. We examined the primary types of both species, which are conspecific, and here reconfirm Cresson's synonymy.

#### METHODS AND MATERIALS

The descriptive terminology, with the exceptions noted in Mathis (1986) and Mathis and Zatwarnicki (1990a), follows that published in the *Manual of Nearctic Diptera* (McAlpine 1981). Because specimens are small, usually less than 3.5 mm in length, study and illustration of the male terminalia required use of a compound microscope. We have followed the terminology for most structures of the male terminalia that other workers in Ephydriidae have used (see references in Mathis 1986, and Mathis and Zatwarnicki 1990a, 1990b), such as surstylus. Zatwarnicki (1996) suggested that the pre- and postsurstylus correspond with the pre- and postgonostylus and that the subpandrial plate is the same as the median-drium. The terminology for structures of the male terminalia is provided directly on Figs. 1–14. The species descriptions are composite and not based solely on the holotypes. One head and two venational ratios that are used in the descriptions are defined below (all ratios are based on three specimens (the largest, smallest, and one other). Costal vein ratio: the straight line distance between the apices of  $R_{2+3}$  and  $R_{4+5}$ /distance between the apices of  $R_1$  and  $R_{2+3}$ . M vein ratio: the straight line distance along vein M between crossveins dm-cu and r-m/distance apicad of dm-cu.

Distribution maps were made using ESRI

ArcView® GIS 3.2. Longitude and latitude coordinates were obtained for the locality where each specimen was collected and entered into a Microsoft Excel® spreadsheet. If unavailable directly from specimen labels, longitude and latitude were estimated using gazetteers and maps to determine the geographical coordinates.

Although many specimens examined for this study are in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM), we also borrowed and studied numerous specimens that are deposited in the following museums: ANSP—Academy of Natural Sciences of Philadelphia, Pennsylvania; MCZ—Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts; and OHSU—Ohio State University, Columbus, Ohio.

#### SYSTEMATICS

##### KEY TO NEARCTIC SPECIES OF *PSILOPA* WITH SLIGHTLY DARKENED WING BASE

1. Apical tarsomere dark brown, contrasted with yellow remaining tarsomeres; scutellum trapezoidal, posterior margin truncate . . . . .  
 . . . . . *Psilopa loewi*, new species
- Apical tarsomere pale, concolorous with other tarsomeres; scutellum triangular, posterior margin broadly pointed . . . *Psilopa aeneonigra* Loew

##### *Psilopa aeneonigra* Loew (Figs. 1–15)

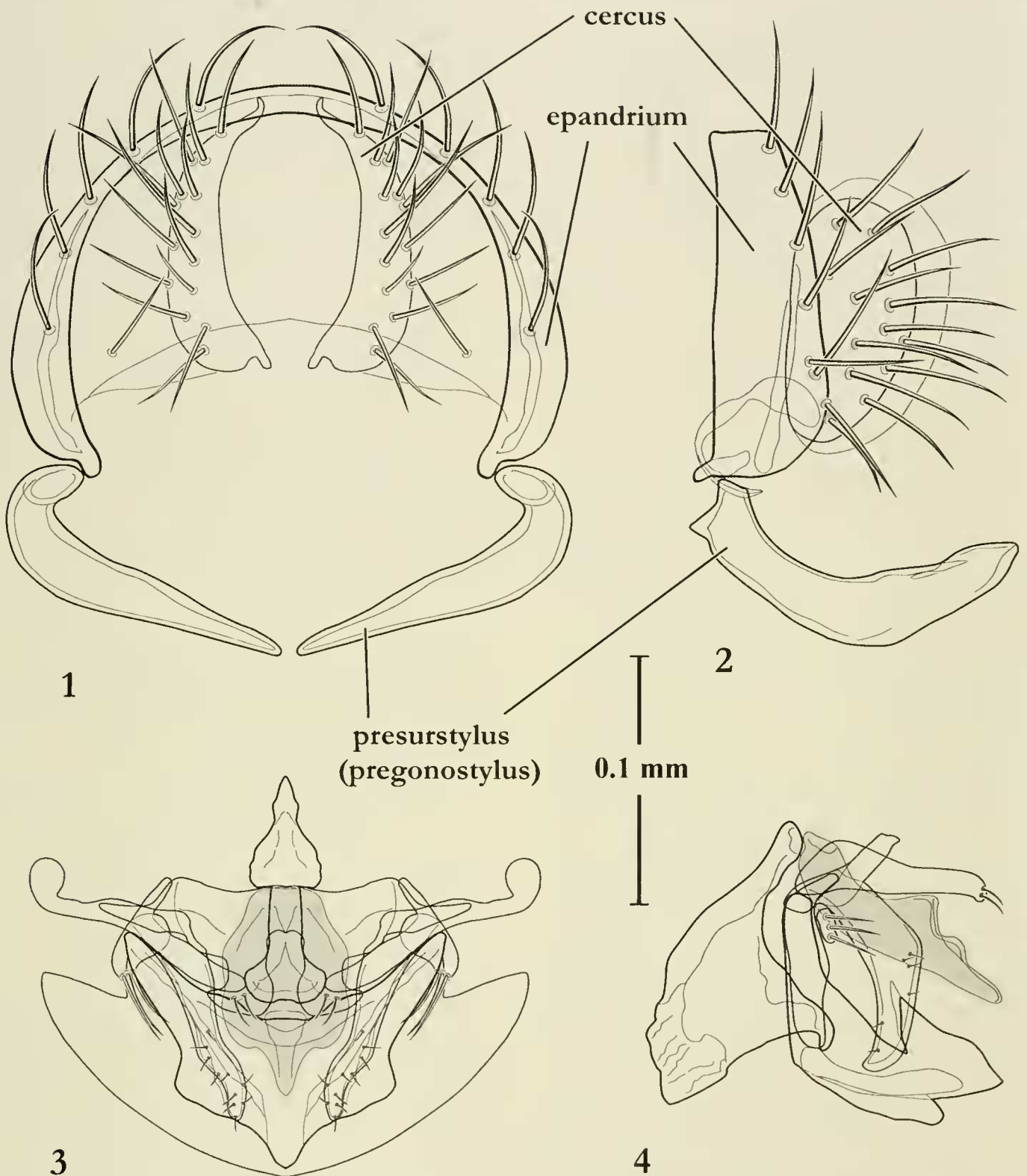
*Psilopa aeneonigra* Loew 1878: 196.—  
Cresson 1942: 125 [fauna, eastern United States].

*Cressonomyia aeneonigra*: Wirth 1965: 742 [Nearctic catalog; generic combination].—Mathis and Zatwarnicki 1995: 34 [world catalog].

*Psilopa fulvipennis* Hine 1904: 64.—Cresson 1942: 125 [synonymy with *Psilopa aeneonigra* Loew].

Description.—Moderately small shore flies, body length 2.30–2.65 mm; largely black.

*Head*: Frons sparsely microtomentose, subshiny. Antenna yellow except for black-



Figs. 1–4. Structures of the male terminalia of *Psilopa aeneonigra* (Massachusetts, Bristol: New Bedford). 1, Epandrium, cerci, and presurstylus, posterior view. 2, Same, lateral view. 3, Internal genitalic structures (aedeagus (shaded), phallapodeme, subepandrial plate, postsurstylus, pregonite, postgonite, and hypandrium), ventral view. 4, Same, lateral view.

ish apicodorsal portion of 1st flagellomere; arista bearing 6 dorsal rays. Face moderately densely microtomentose, mostly flat, bearing 1 large, ventral, cruciate seta.

**Thorax:** Mesonotum sparsely microtomentose, subopaque to subshiny, microgranulose; scutellum triangular, posterior

margin broadly pointed. Wing hyaline, only stem base blackish; costal vein ratio 0.89–0.93; M vein ratio 0.65–0.70. Knob of halter white to pale yellow, stem brownish. Legs black except for yellow apex of tibiae and tarsi, including the apical tarsomere.

**Abdomen:** Tergites more sparsely micro-



tomentose than mesonotum, subshiny to shiny black. Male terminalia (Figs. 1–14): Epandrium in posterior view (Fig. 1) broadly U-shaped, rounded, moderately wider ventrolaterally than dorsally; cerci in posterior view (Fig. 1) rodlike, medial margin shallowly concave, much narrower dorsally, dorsal apex slightly recurved, ventral margin with submedial indentation; presurstylus in posterior view (Fig. 1) as gradually tapered rods, apex pointed, base curved dorsally, in lateral view (Fig. 2) shallowly curved, nearly parallel sided; postsurstylus in lateral view (Figs. 4, 12) 3–4× longer than wide, elbowed at middle, bearing tiny setulae on apical half, in ventral view (Figs. 3, 11) appearing narrower and more angulate, base with rounded, angulate dorsally curved process; pregonite in lateral view (Figs. 4, 10) as a simple, rodlike sclerite, bearing 3 setulae in ventral view (Figs. 3, 9) with length about twice height, rounded; postgonite in lateral view (Figs. 4, 10) larger than pregonite, also rodlike, slightly bulged medially, base drawn out into narrow, short process; aedeagus in lateral view wide basally, curved and narrowed to slender, apex, dorsal margin with 2 shallow prominences; phallapodeme in lateral view (Figs. 4, 6) with keel well developed, broadly and asymmetrically extended; subepandrial plate in lateral view much longer than wide, bearing 2 apical, small, setulae, in dorsal view as in Fig. 7; hypandrium in lateral view (Figs. 4, 14) angulate, roughly L-shaped, with deep, pointed indentation in inner angle, in ventral view (Figs. 3, 13) much wider than long, anterior margin evenly arched, posterior margin concave with sublateral stepped process.

Type material.—The lectotype, which is apparently the only remaining male of *Psilopa aeneonigra* Loew, is here designated to preserve stability and make more universal the use of this name, is labeled “Texas Lefr. [green; handwritten]/Loew Coll./aeneonigra m. [handwritten]/Type 11139 [red; number handwritten]/Cressonomyia aeneonigra (Lw.) WWirth/61 [black sub-

margin; all except “WWirth” handwritten]/LECTOTYPE ♂ *Psilopa aeneonigra* Loew By Mathis & Zatwarnicki [handwritten except for “LECTOTYPE” and “By”; black sub-border].” The lectotype is directly pinned, is in good condition (abdomen removed and dissected, parts in an attached microvial), and is deposited in the MCZ (11139).

The lectotype female of *Psilopa fulvipennis* Hine, here designated to preserve stability and make more universal the use of this name, is labeled “Cameron, L[ouisian]a Aug.14–28,1903/TYPE/*Psilopa fulvipennis* Hine [handwritten; black border]/LECTOTYPE *Psilopa fulvipennis* Hine ♀ By Mathis and Zatwarnicki [handwritten except for “LECTOTYPE” and “By”; black sub-border].” The lectotype is double mounted (glued to a narrow, paper point), is in excellent condition, and is deposited in OHSU. There are two female paralectotypes that bear the same locality label as the lectotype.

Other specimens examined.—Nearctic: UNITED STATES. FLORIDA. *Levy*: Cedar Key, 21 Feb 1990, W. H. Pierce (1♂; USNM). *Orange*: Orlando, 7 Feb 1918, J. M. Aldrich (1♂; ANSP).

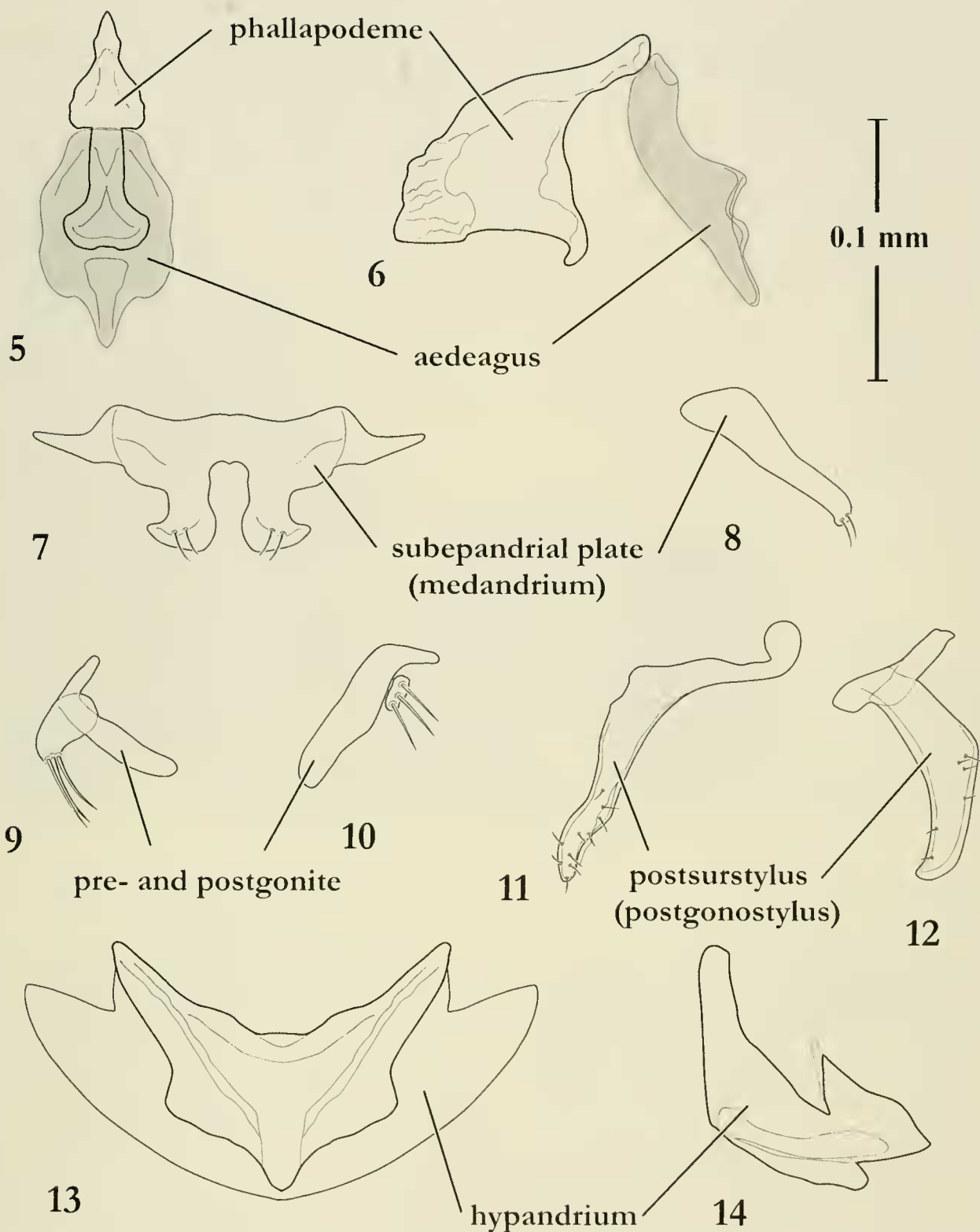
LOUISIANA. *Orleans*: New Orleans, 28 Mar 1905 (3♂, 3♀; ANSP).

MARYLAND. *Queen Anne's*: Kent Narrows (38°58'N, 76°14'W), Jul 1954, M. R. Wheeler (1♀; USNM). *Worcester*: Seaside, 21 Jun 1931, A. L. Melander (1♀; ANSP).

MASSACHUSETTS. *Barnstable*: Falmouth (41°33'N, 70°37'W), 9 Aug 1952, A. H. Sturtevant (1♀; USNM); Sandwich (41°45'N, 70°29'W), 22 Jun 1924, A. H. Sturtevant (1♀; USNM); Woods Hole (41°31'N, 70°41'W), 5–21 Jul 1922, A. H. Sturtevant (5♀; USNM). *Bristol*: New Bedford (41°38'N, 70°56'W), J. M. Aldrich (1♂, 1♀; USNM).

NEW JERSEY. *Cape May*: Avalon, 8 Aug (1♀; ANSP); Cape May, 1 Jun (1♂; ANSP).

NEW YORK. *New York*: New York, 28 Oct 1922, A. H. Sturtevant (2♀; USNM).



Figs. 5-14. Structures of the male terminalia of *Psilopa aeneonigra* (Massachusetts. Bristol: New Bedford). 5, Aedeagus and phallapodeme, ventral view. 6, Same, lateral view. 7, Subepandrial plate, ventral view. 8, Same, lateral view. 9, Pregonite and postgonite, ventral view. 10, Same, lateral view. 11, Postsurstylus, ventral view. 12, Same, lateral view. 13, Hypandrium, ventral view. 14, Same, lateral view.

Montauk, Long Island, 17 Aug 1946, L. D. Beamer (1♂; USNM).

NORTH CAROLINA. *Hyde*: Lake Landing (35°28'N, 76°04'W), 13 Nov 1939, J. E. Graf (1♀; USNM).

VIRGINIA. *King George*: Mathias Point

(38°24'N, 77°03'W), 4 Aug 1913, R. C. Shannon (1♀; USNM).

Distribution (Fig. 15).—*Nearctic*: United States (Florida, Louisiana, Maryland, Massachusetts, North Carolina, New Jersey, New York, Texas, Virginia). The distribu-



Fig. 15. Distribution map for *Psilopa aeneonigra*. The unspecified locality in Texas is indicated by a “?” in the middle of the state.

tion of this species is primarily along the coastal plain of the eastern United States as far north as Massachusetts. Although there are a few records from freshwater sites, most localities are predominantly brackish-water habitats.

Remarks.—Although the base of the wing is slightly darkened, as in species of *Cressonomyia*, there are no other synapomorphic features of this species that indicate its relationships with that genus.

Since Cresson (1942), the generic placement of this species has been confused. Cresson (1942: 125, 127) treated it twice, first under *Psilopa* (key and listing) and then again in his key to the species of *Plagiopsis* (= *Cressonomyia* Arnaud). In the latter key, however, Cresson continued to cite the species as “*Psilopa aeneo-nigra* Loew.” Apparently Wirth (1965) noted Cresson’s double usage and decided that the

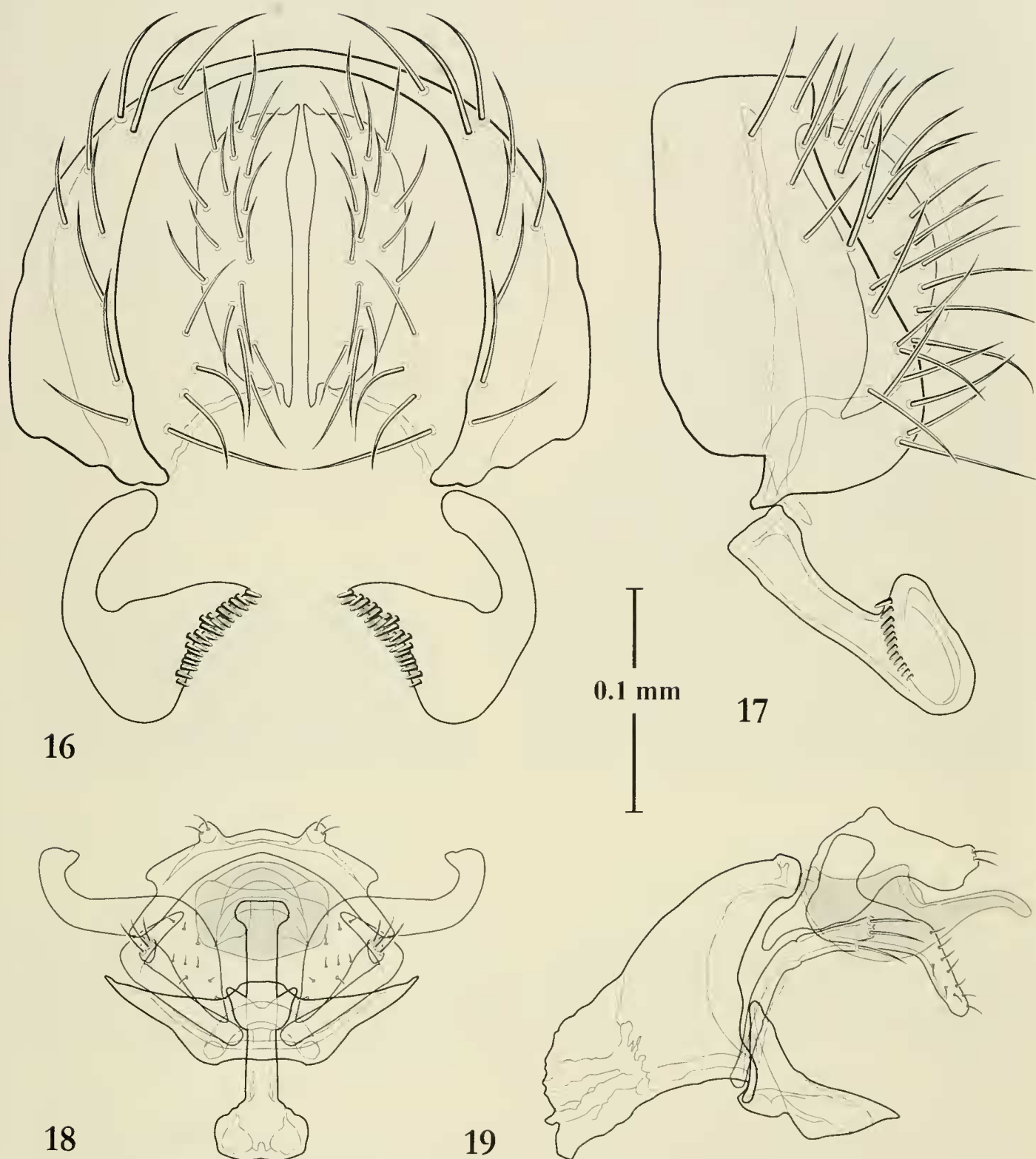
species should be cataloged under *Cressonomyia*, where it has remained since. As part of this study, we examined characters of the external morphology and male terminalia. Based on these observations, this species was returned to *Psilopa*. We also discovered that there are two species (this species and the new species described below), represented among the specimens previously identified as this species.

***Psilopa loewi* Mathis and Zatwarnicki,  
new species  
(Figs. 16–30)**

Description.—Moderately small shore flies, body length 2.25–2.85 mm; largely black.

*Head*: Frons sparsely microtomentose, subopaque to subshiny. Antenna yellow except for blackish apicodorsal portion of 1st flagellomere; arista bearing 6 dorsal rays,





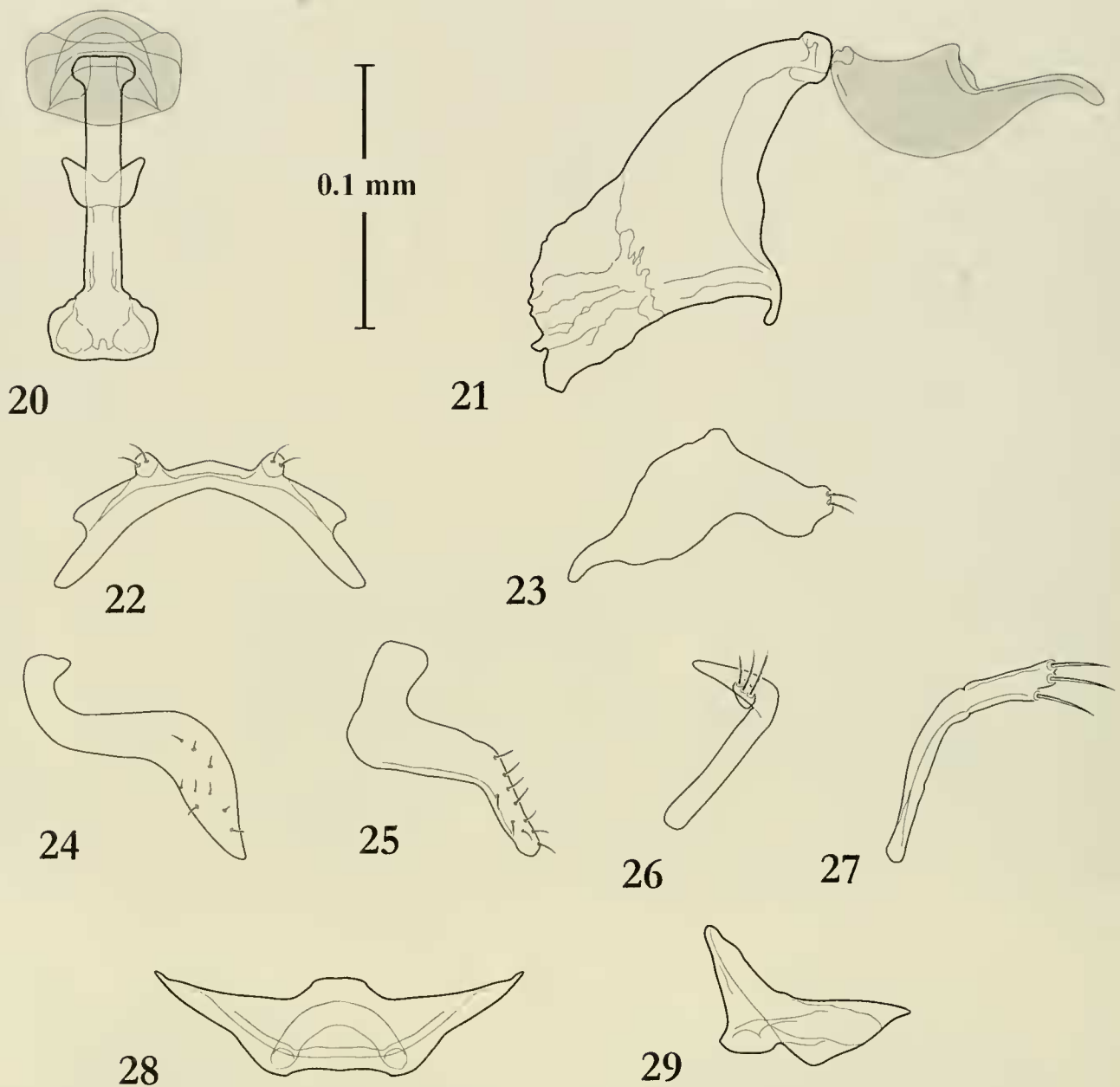
Figs. 16–19. Structures of the male terminalia of *Psilopa loewi* (Georgia, McIntosh: Sapelo Island (31°28'N, 81°14'W)). 16, Epandrium, cerci, and presurstylus, posterior view. 17, Same, lateral view. 18, Internal genitalic structures (aedeagus (shaded), phallapodeme, subepandrial plate, postsurstylus, pregonite, postgonite, and hypandrium), ventral view. 19, Same, lateral view.

rarely 5 (probably representing a ray that was broken off). Face moderately densely microtomentose, mostly flat, bearing 1 large, ventral, cruciate seta.

*Thorax:* Mesonotum sparsely microtomentose, subshiny; scutellum trapezoidal posterior margin truncate. Wing hyaline,

only stem base blackish; costal vein ratio 0.87–0.90; M vein ratio 0.68–0.70. Knob of halter white to pale yellow, stem brownish. Legs black except for apex of tibiae and tarsi; apical tarsomere brownish black to black.

*Abdomen:* Tergites more sparsely micro-



Figs. 20–29. Structures of the male terminalia of *Psilopa loewi* (Georgia, McIntosh: Sapelo Island (31°28'N, 81°14'W)). 20, Aedeagus and phallapodeme, ventral view. 21, Same, lateral view. 22, Subepandrial plate, ventral view. 23, Same, lateral view. 24, Postsurstylus, ventral view. 25, Same, lateral view. 26, Pregonite and postgonite, ventral view. 27, Same, lateral view. 28, Hypandrium, ventral view. 29, Same, lateral view.

tomentose than mesonotum, subshiny to shiny black. Male terminalia (Figs. 16–29): Epandrium in posterior view (Fig. 16) broadly U-shaped, rounded, in lateral view (Fig. 17) considerably wider ventrolaterally than dorsally; cerci in posterior view (Fig. 16) almost rodlike, less curved ventrally, lateral margins rounded, medial margin very shallow; presurstylus in posterior view (Fig. 16) deeply incised mediodorsally, forming a narrow, parallel sided base that expands abruptly on apical half to wide apex that bears row of short, stout, peglike setulae along  $\frac{2}{3}$  length; postsurstylus in lat-

eral view (Figs. 19, 25) longer than wide, rounded angulate, apical  $\frac{1}{3}$  bearing setulae, very gradually tapered, almost parallel sided; pregonite in lateral view (Figs. 19, 27) L-shaped, arm bearing 3 apical setae wider than basal, slender arm; aedeagus in lateral view (Figs. 19, 21) wide basally, curved and narrowed to slender, parallel sided apex; phallapodeme in lateral view (Figs. 19, 21) with keel well developed, broadly and asymmetrically extended; subepandrial plate in ventral view (Figs. 22) deeply incised medially and with smaller incision basolaterally, extended laterally as a narrowed



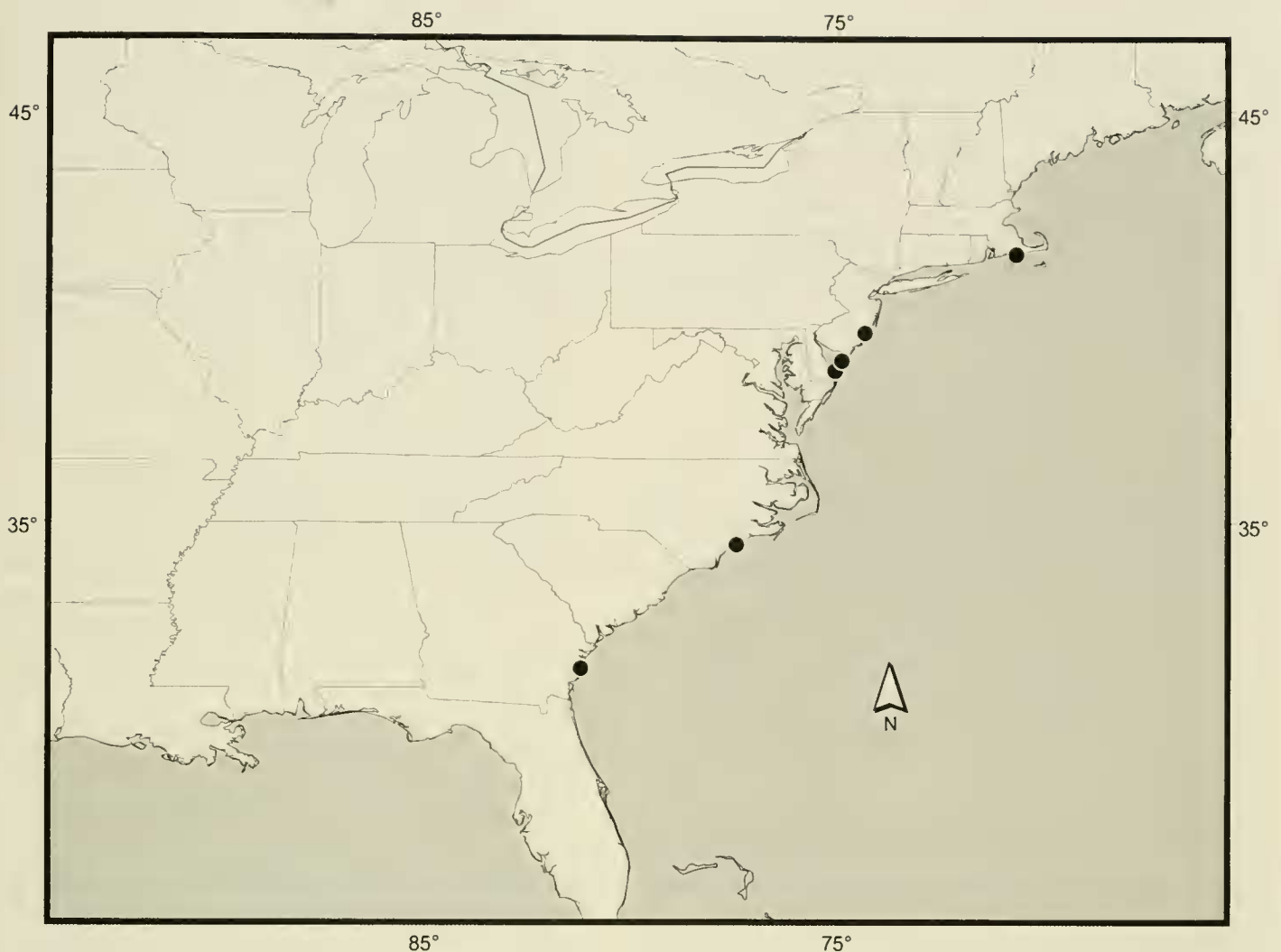


Fig. 30. Distribution map for *Psilopa loewi*.

process: hypandrium in lateral view (Fig. 29) L-shaped, extended arm tapered to more narrow process, in ventral view (Figs. 28) broadly U-shaped with anterior margin projected medially and with symmetrical, shallow, lateral pointed projection anterolaterally.

Type material.—The holotype male is labeled “USA. NJ. Ocean: Tuckerton (10 km N; 39°41.3'N, 74°21.6'W), 26 Sep 2003[,] D. & W. N. Mathis/USNM ENT 00201689 [plastic bar code label]/HOLOTYPE ♂ *Psilopa loewi* W.N. Mathis & T. Zatwarnicki USNM [red; species name, gender symbol, and “& T. Zatwarnicki” handwritten].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Thirty-four paratypes (16♂, 18♀; USNM) bear the same label data as the holotype. Other paratypes are as follows: United States.

DELAWARE. *Sussex*: Dewey Beach, 27 Aug–1 Sep 1972, L. V. Knutson (1♀; USNM). GEORGIA. *Mchitosh*: Sapelo Island (31°28'N, 81°14'W; on *Spartina*), Jun 1963, H. Kale (2♂, 2♀; USNM). MASSACHUSETTS. *Barnstable*: Woods Hole (41°31'N, 70°41'W), 5–21 Jul 1922, A. H. Sturtevant (1♂; USNM). NEW JERSEY. *Cape May*: Cape May, 27 Jun–1 Jul, C. W. Johnson (1♂; MCZ). *Ocean*: Tuckerton, 1 Jul 1995, M. J. Raupp (1♂, 1♀; USNM). NORTH CAROLINA. *Onslow*: Ashe Island (on *Spartina alterniflora*), 19 Aug 1975, J. C. Dukes (2♂; USNM).

Distribution (Fig. 30).—*Nearctic*: USA (Delaware, Georgia, Massachusetts, North Carolina, New Jersey).

Etymology.—The species epithet, *loewi*, is a genitive patronym to recognize the pioneering research and publications of Hermann Loew on North American Ephydriidae.

Remarks.—This species is very similar to *P. aeneonigra*, especially externally, and until now, *P. loewi* was often misidentified. Structures of the male terminalia, however, differ markedly, and after segregation based on genitalic characters, we discovered external characters that will distinguish these two species (shape of scutellum and color of apical tarsomere).

#### ACKNOWLEDGMENTS

We gratefully acknowledge the assistance and cooperation of many organizations and individuals who contributed to the field work and production of this paper. To Jon K. Gelhaus and Jason D. Weintraub (ANSP), Philip D. Perkins (MCZ), Peter W. Kovarik (OHSU), and their institutions, who loaned specimens, we express our sincere thanks.

Hollis B. Williams provided technical support and produced the maps. James F. Edmiston advised on the production of the maps and reviewed the manuscript. We also thank Stephen D. Gaimari and Allen L. Norrbom for reviewing a draft of this paper.

#### LITERATURE CITED

- Cresson, E. T., Jr. 1942. Synopses of North American Ephydriidae (Diptera) I. The subfamily Psilopinae, with descriptions of new species. *Transactions of the American Entomological Society* 68: 101–128.
- Hine, J. S. 1904. On Diptera of the family Ephydriidae. *The Ohio Naturalist* 4(3): 63–65.
- Loew, H. 1878. Neue nordamerikanische Ephydrinen. *Zeitschrift für die Gesamten Naturwissenschaften* 51: 192–203.
- Mathis, W. N. 1986. Studies of Psilopinae (Diptera: Ephydriidae), 1: A revision of the shore fly genus *Placopsidella* Kertész. *Smithsonian Contributions to Zoology* 430: 30 + iv pp.
- Mathis, W. N. and T. Zatwarnicki. 1990a. A revision of the western Palearctic species of *Athyroglossa* (Diptera: Ephydriidae). *Transactions of the American Entomological Society* 116(1): 103–133.
- . 1990b. Taxonomic notes on Ephydriidae (Diptera). *Proceedings of the Biological Society of Washington* 103(4): 891–906.
- . 1995. A world catalog of the shore flies (Diptera: Ephydriidae). *Memoirs on Entomology, International* 4: vi + 423 pp.
- . 2004. A revision of the shore-fly genus *Cressonomyia* Arnaud with comments on species that have been excluded (Diptera: Ephydriidae). *Proceedings of the Entomological Society of Washington* 106(2): 249–279.
- McAlpine, J. F. 1981. Morphology and terminology—Adults, pp. 9–63. In McAlpine, J. F., et al., eds. *Manual of Nearctic Diptera, Volume 1*. Ottawa, 674 pp. [Volume 1 is Monograph 27 of Research Branch Agriculture Canada.]
- Osten Sacken, C. R. 1903. Record of my life work in entomology. University Press, Cambridge ix + 204 pp. [Facsimile reprint with an appreciation and introductory preface by K. G. V. Smith 1978, in *Classica Entomologica*, vol. 2, E. W. Classey.]
- Wirth, W. W. 1965. Ephydriidae, pp. 734–759. In Stone, A., C. W. Sabrosky, W. W. Wirth, R. H. Foote, and J. R. Coulson, eds. *A catalog of the Diptera of America north of Mexico*. United States Department of Agriculture, Agriculture Handbook No. 276, 1696 pp.
- Zatwarnicki, T. 1996. A new reconstruction of the origin of eremoneuran hypopygium and its classification implications (Insecta: Diptera). *Genus* 7(1): 103–175.